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USDA YIELD GRADES FOR BEEF

INTRODUCTION



The value of a beef carcass depends chiefly upon two factors—the quality of the meat and the amount of salable meat the carcass will yield, particularly the yield of the high-value, preferred retail cuts.

USDA quality grades for beef—Prime, Choice, Good, Standard, Commercial, Utility, Cutter, Canner—have for many years served as nationally reliable guides to the eating quality of beef—its tenderness, juiciness, and flavor. The USDA has conducted a voluntary meat grading service to identify beef for these differences in quality since 1927.

In the same way, USDA yield grades for beef, which have been available for industry use only since June 1965, provide a nationally uniform method of identifying “quantity” or “cutability” differences among beef carcasses. Specifically, they are based on the percentage yields of boneless, closely trimmed, retail cuts from the high-value parts of the carcass—the round, loin, rib, and chuck—which account for more than 80 percent of its value. However, they also reflect differences in total yields of retail cuts.

There are five USDA yield grades, numbered 1 through 5. Yield Grade 1 carcasses have the highest yields of retail cuts, Yield Grade 5 the lowest. A carcass which is typical of its yield grade would be expected to yield about 4.6 percent more in retail cuts than the next lower yield grade, when

USDA cutting and trimming methods are followed. (Other differences in yield may result from different cutting procedures but these should be similar between yield grades.) At early 1968 prices, differences in yields of meat between typical carcasses of adjacent yield grades make a value difference of about \$3.60 per hundredweight.

But what about the live animals? There are quality and yield grades for these, too, which relate directly to the quality and yield grades for the carcasses they will produce. Thus, just as the quality grades for slaughter cattle have long been a major factor in determining their sales value, their yield grade can now be appraised and given appropriate consideration.

When used in conjunction with quality grades, yield grades can be of benefit to all segments of the industry.

- To the producer—They provide a means to identify breeding and slaughter cattle for differences in yields of salable meat—a valuable tool in selecting breeding stock and in planning and operating the most efficient production, feeding, and marketing program. Properly used, yield grades could bring about more efficiency in production and marketing—and increase profits.
- To the packer—They furnish an additional tool which will permit him to more precisely evaluate differences in value among the animals he buys and the meat he sells.

- To the retailer—They provide a means for purchasing beef with assurance as to its yield of retail cuts and, therefore, its value.
- To the consumer—They provide an indirect means for reflecting consumers' preferences for beef with a high ratio of lean to fat and bone back through retailers and packers to the producer. This could result in better values for consumers. Also, when consumers buy carcasses or wholesale cuts for freezer storage, yield grades are an excellent guide to yields of meat that will be obtained.



This booklet explains how yield grades can be of value to everybody concerned with beef, from producer to consumer. For copies of the official standards for grades of beef and slaughter cattle, write the Livestock Division, Consumer and Marketing Service, U.S. Department of Agriculture, Washington, D.C. 20250.

BEHIND THE YIELD GRADE MARK

Variations in yields of retail cuts among carcasses are accounted for chiefly by two factors: (1) the amount of fat that must be trimmed from the carcass in making the cuts, and (2) the thickness and fullness of the muscling.

Indicators of those factors are the four measures on which yield grades are based: (1) amount of external fat, (2) size of the ribeye muscle, (3) quantity of kidney, pelvic, and heart fat, and (4) carcass weight.

External Fat

The amount of fat over the outside of a carcass is the most important yield grade factor since it is a good indication of the amount of fat that is trimmed in making retail cuts. A single fat thickness measurement over the ribeye muscle has been found to be the most practical indicator of external fatness for use in a grading program. This measurement is made after the side has been separated into a forequarter and a hindquarter. It can be estimated very accurately but it can also be measured. Figure 1 shows how this measurement is made.



Figure 1

The grader may adjust this fat thickness measurement when he notes unusual amounts of fat on other parts of a carcass. Four-tenths of an inch variation in thickness of fat over the ribeye makes a full yield grade change.

Area of Ribeye

The ribeye muscle lies on each side of the backbone and it runs the full length of the back. It is the largest muscle in the carcass and one of the most palatable. When the side is separated into a forequarter and a hindquarter a cross-section of the ribeye muscle is exposed. Its area (in square inches) at this point is another factor used in determining the yield grade. In normal grading operations, graders develop an ability to estimate the area of the ribeye quite accurately. However, if necessary, it can also be measured very quickly by means of a clear plastic grid placed over the cut surface as shown in Figure 2. Among carcasses of the same fatness and weight, an increase in the ribeye area indicates an increase in the yield of retail cuts. A change of about 3 square inches in ribeye area makes a full yield grade change.

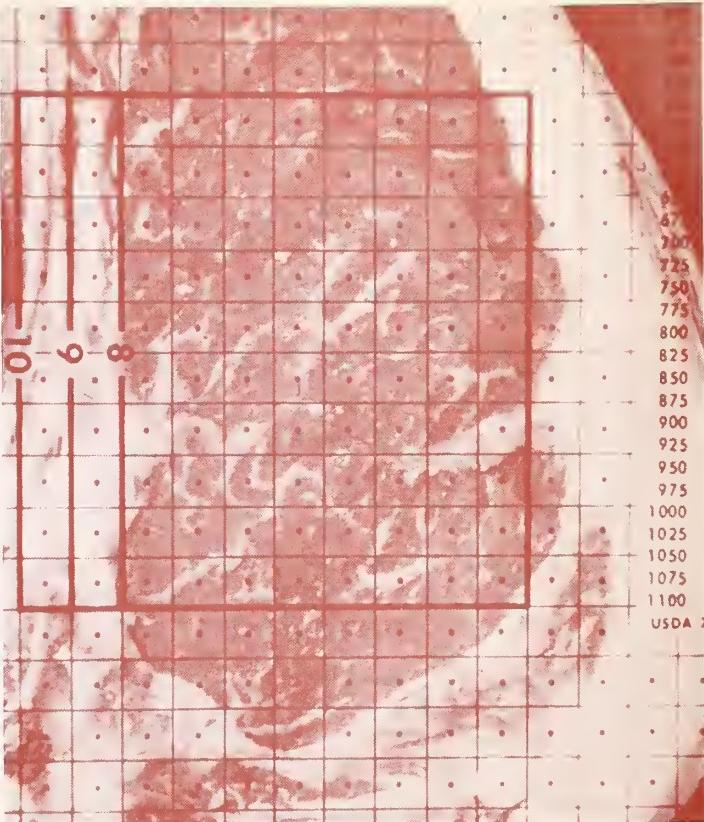


Figure 2

Kidney, Pelvic, and Heart Fat

Fat deposits on the inside of the carcass around the kidney and in the pelvic and heart areas also affect yields. Since practically all of this fat is removed in trimming, increases in these fats decrease the yields of retail cuts. Figure 3 shows the kidney and pelvic fat in a hindquarter. A change of 5 percent in these fats makes a full yield grade change.

Carcass Weight

The "warm" carcass weight (weight before chilling) is the weight used in yield grading. When carcass weight is used in conjunction with the other three factors, an increase in weight indicates a decrease in the yield of retail cuts. Weight is the least important yield grade factor. It takes a change of about 250 pounds in carcass weight to make a full yield grade change.

Since yield grades essentially measure proportions of lean and fat, USDA meat graders—who are highly trained specialists in their field—can determine the correct yield grade of most carcasses after a simple, rapid, visual appraisal of the fatness and muscling of the carcass. But objective measurements can be made when necessary and the yield grade also can be calculated from an equation which gives each factor its proper weight. Very little extra time is required to grade carcasses for both quality and yield over that required to grade them only for quality.



Figure 3

YIELD GRADES FOR THE PRODUCER

A meat-type steer will produce a thickly muscled carcass having high quality lean and a minimum of excess fat. Such a carcass will grade high in both quality and yield.

Both breeding and feeding enter into the production of meat-type cattle. Thickness of muscling is definitely a heritable trait. So is the ability to produce high quality lean without a thick covering of excess fat.

Feeding is also important, because high quality lean is normally produced only through a relatively long turn in the feedlot. On the other hand, feeding truly meat-type cattle for excessively long periods or to excessively heavy weights will make even their carcasses wasty, with low yields of retail cuts.

Evaluating cattle in terms of their yield grade is very useful in appraising their value. Cattle having a high yield of retail cuts will be thickly muscled and have little fat. Those that are very fat and thinly muscled will have a low yield of retail cuts. Since differences in fatness and muscling both affect the appearance of the live animal and since fatness

and muscling have opposite effects on yields of cuts, evaluating animals for yield grade requires an ability to make separate, accurate evaluations of those two factors.

Cattle vary more in their degree of fatness than in muscling. Therefore, the ability to estimate this factor correctly is of primary importance in determining the yield grade. This can be done best by observing the areas where fat is deposited most rapidly—over the back, rump, and hips, around the middle, and in the twist, flank, and brisket. As cattle increase in fatness, these parts appear progressively fuller, thicker, and more distended in relation to the thickness and fullness of the other parts, particularly the round.

On the other hand, the muscular development of the animal can best be evaluated by observing those parts which are least affected by fatness. Since fat is deposited over the round and forearm at a relatively slow rate, these are the best parts to observe in appraising muscling. The thickness and fullness in these areas is due largely to thickness of the muscles.



*Steer A
Side view*

Figure 4

These pictures show two steers of the same quality grade—Choice—weighing nearly the same—about 1,100 pounds—but differing widely in their yield of lean meat. Steer A, shown in Figure 4, is the much sought-for meat-type steer that combines thick muscling and high quality lean with a minimum of excess fat. Steer A is a Yield Grade 2 while Steer B, shown in Figure 5, is a Yield Grade 4. In the side views, notice the greater degree of trimness and apparent firmness of Steer A. Steer B is deeper and fuller in his hind and fore flanks, fuller in the brisket and fuller in front of the shoulders. He is also more prominent in his hips and he is beginning to get some rolls down over his side. He is also slightly rough and patchy around his rump. These are all indications that Steer B is much fatter than Steer A. Now look at the indications of muscling. Here Steer A clearly excels. Notice the greater bulge to his round—the more prominent shoulder—the



*Steer A
Rear View*

*Steer B
Side view*



*Steer B
Rear view*



Figure 5

plumper, thicker forearm—the bulging muscles of the round just above the flank. These are all signs of muscling.

Now compare the rear view of the same two steers. Here again note the greater fullness and fatness over the rump—and the deeper, fuller twist of Steer B. These are due to fat. Also note the greater width and plumpness of the round of Steer A. This greater width and plumpness, despite the fact that he is not nearly as fat as Steer B, again indicates that Steer A is much more muscular. The faint diagonal line on the outside of Steer A's round is a depression at the juncture of muscles. Steer A's muscles would fairly ripple when he walks. Steer B lacks plumpness of round. He is nearly flat on the outside of the round and is noticeably narrower through the lower part of his round than he is higher up.



Figure 6
Carcass of
Steer X



Figure 7
Carcass of
Steer Y

(Photos courtesy of Iowa State University)

Now, let's go a step further. Here are the carcasses of two other steers frozen in an upright position and then cross-sectioned at two places to show how the live animals would have appeared. The carcass of Steer X, Figure 6, weighed 631 pounds. Steer Y's carcass, Figure 7, weighed 688 pounds. The first two photos show cross-sections at the bulge of the round. Thickness through this region is largely

due to muscle. Note that Steer X has much thicker, plumper muscles and a thinner fat covering especially over his rump and in his twist. These are two areas where fat is deposited at a faster-than-average rate. Alive, Steer Y would have appeared deeper in his quarter but the pictures clearly show that this is due to fat—not muscle. Also note on Steer Y that much of the thickness of the lower round is due to the



*Figure 8
Carcass of
Steer X*



*Figure 9
Carcass of
Steer Y*

(Photos courtesy of Iowa State University)

fat between the muscles—and how much thinner he would be through this region without that fat.

These two pictures, Figures 8 and 9, were taken at the 12th rib where sides are separated into forequarters and hindquarters. This is an area where fat is deposited at a relatively fast rate and where differences in both fatness and muscling are easily seen. It is obvious that Steer X has

a much higher ratio of lean to fat but let's make a few actual comparisons:

	Steer X	Steer Y
Carcass weight, pounds	631	688
Area of ribeye, square inches	14.5	10.6
Thickness of fat over ribeye, inches	0.6	1.5

Note, also, how much thicker all of the other muscles are on Steer X. Despite the fact that Steer X weighs nearly 60 pounds less than Steer Y, his ribeye is nearly 4 square inches larger and he has less than half as much fat.

Steer X was a "meat-type" steer. His carcass would have qualified as a Yield Grade 2; Steer Y's carcass would have been a Yield Grade 5. Based on differences in yields of retail cuts, Steer X would have been worth \$7 more per hundredweight on a live basis than Steer Y.

Value differences of \$7 per hundredweight—\$70 on a 1,000-pound steer—are the exception rather than the rule. However, differences in value of \$20 to \$30 per head are quite common. Tests have shown that a difference of only one yield grade can result in a value difference of \$2 per hundredweight on a live basis—\$20 on a 1,000-pound steer. Just think how much it would mean to the cattle industry if all cattle were improved by the equivalent of one yield grade!

USDA's Carcass Evaluation Program

With a little practice, nearly anyone can learn to differentiate between thin-muscled, overfat, wasty cattle and the trim, thick-muscled kinds that produce carcasses having a high percentage of their weight in trimmed retail cuts. But for a factual evaluation of the kind of carcasses his cattle produce, a producer or feeder may use USDA's Beef Carcass Evaluation Service.

This service is provided on a fee basis and may be requested from any USDA meat grading office. The fee will vary depending upon the amount of information requested and expenses incurred by the grader, such as travel.

After the carcass is chilled, the grader records the information requested for each animal on a USDA form which is forwarded to the producer or feeder requesting the service. A copy of this form is shown in Figure 10. Any, or all, of the information on this form may be requested.

Use of this service can provide cattlemen with the necessary information to help them select strains of cattle and production methods which produce the highest value carcasses—those with high quality lean and a high yield of salable meat.

BEEF CARCASS EVALUATION REPORTU. S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
LIVESTOCK DIVISION

USDA NO.	OTHER IDENTIFICATION	BREED (<i>As supplied by owner</i>)	MEAT GRADING CERTIFICATE NO.
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NAME OF PRODUCER	NAME OF PACKER
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1 QUALITY GRADE <hr/> BY THIRDS	A. CONFORMATION, MARBLING, AND Maturity FACTORS		
	CONFORMATION	DEGREE OF MARBLING	Maturity (APPROXIMATE AGE SHOWN) (Circle one)
		A <i>(Under 30 mos.)</i> B C D E <i>(30 to 48 mos.)</i> C D <i>(Over 48 mos.)</i>	

B. OTHER FACTORSTEXTURE OF MARBLING (*Check one*)

FINE MEDIUM COARSE

COLOR OF LEAN (*Check one*)

VERY LIGHT CHERRY RED CHERRY RED SLIGHTLY DARK RED MODERATELY DARK RED DARK RED VERY DARK RED BLACK

FIRMNESS OF LEAN (*Check one*)

VERY FIRM FIRM MODERATELY FIRM SLIGHTLY SOFT SOFT VERY SOFT EXTREMELY SOFT

TEXTURE OF LEAN (*Check one*)

VERY FINE FINE MODERATELY FINE SLIGHTLY FINE SLIGHTLY COARSE COARSE VERY COARSE

2 YIELD GRADE <hr/> BY TENTHS	YIELD FACTORS				
	CARCASS WEIGHT (From packer's hot wt. tag)	FAT THICKNESS (Inches, nearest 1/10 in.)	RIB EYE AREA (from Grid)	KIDNEY, PELVIC AND HEART FAT (As per- cent of carcass weight)	
	LB. <hr/> ACTUAL <hr/> ADJUSTED	IN. <hr/> IN.	BY TENTHS <hr/> SQ. IN.	ESTIMATED <hr/> PCT.	



(DATE)

(SIGNATURE OF GRADER)

Figure 10

YIELD GRADES FOR THE RETAILER

Retailers have long relied on the familiar USDA quality grades to provide them with beef of consistent quality. But this is not always enough. Consumers' increasing aversion to fat has forced retailers to trim fat from retail cuts in ever-increasing amounts. Because beef of the same quality grade varies so widely in fatness, this affects yields of cuts—and profits—and increases retailers' need for a means of purchasing which will insure close control of "cutability". In an effort to control the cutability of their beef purchases some retailers have hired selectors who personally select the kinds of carcasses desired. Although this approach can be effective, it is usually quite expensive. Other retailers have developed specifications for a kind of beef they want and restrict their purchases to that kind. That approach usually is not entirely satisfactory because the specifications may be inadequate to insure the cutability control desired and also because the specifications are not applied by a disinterested party. It also restricts their purchases to a particular kind of carcass, thereby narrowing the range of acceptance within a quality grade and limiting the available supply.

With USDA yield grades, retailers have a readily available means of buying beef with complete assurance as to its yield of retail cuts.

The higher yield grades are not necessarily the best buy. This depends largely on the price at which beef of each yield grade can be purchased.

By knowing the difference in retail sales value between carcasses of the different yield grades and by getting prices on carcasses of different yield grades, a retailer can purchase beef of any of the five yield grades that will provide him with the greatest margin. This will materially broaden his range of acceptance and increase the available supply.

The following example illustrates the practical use of yield grades in a retail operation:

In buying, a retailer should consider prices for carcasses of each of the five yield grades in relation to their actual retail sales value.

In the example on page 15, there was a difference in retail sales value of \$3.61 per hundredweight between adjacent yield grades (2 and 3 or 3 and 4, etc.). There was also a difference in value of \$7.22 per hundredweight between Yield Grades 1 and 3, 2 and 4, or 3 and 5. Likewise, there was \$10.83 per hundredweight difference in value between Yield Grades 1 and 4 or 2 and 5. Thus, if there had been less than these differences in price between the various grades, the higher yielding grade would have been the better buy. On the other hand, if the price differential between adjacent yield grades had been more than \$3.61 per hundredweight—\$4, for example—it would have been advantageous to buy the lower yielding grade.

If a retailer sells 30,000 pounds of retail cuts and he bought carcasses of these USDA yield grades:



Then he would need to buy this much carcass beef:

36,585 lbs.

38,760

41,210

43,990

47,170

If, for example, he bought 600-pound carcasses he would need this many:

61

65

69

73

78

After preparing and trimming the retail cuts he would have the following yields of:

Fat trim	7.5%	12.6	17.7	22.8	27.9
Bone and shrink	10.5%	10.0	9.5	9.0	8.5
Trimmed cuts	82.0%	77.4	72.8	68.2	63.6

At current retail prices, the retail sales value per cwt. of carcass would be:

\$72.77

69.16

65.55

61.94

58.33

If all the carcasses were USDA Choice and were bought at \$43.00 per cwt., his gross margin as a percent of sales would be:

40.91%

37.83%

34.40%

30.58%

26.28 %

Cutting and trimming costs increase as carcasses increase in fatness. If these costs were included, the differences in margins and sales values between yield grades would be even greater than indicated.

Since July 1965—when the yield grades were adopted—the retail sales values of Choice carcasses of Yield Grades 2, 3, and 4 have been calculated monthly by USDA's Economic Research Service. During that period, the value differences between these grades have varied only slightly and have averaged \$3.61 per hundredweight.:

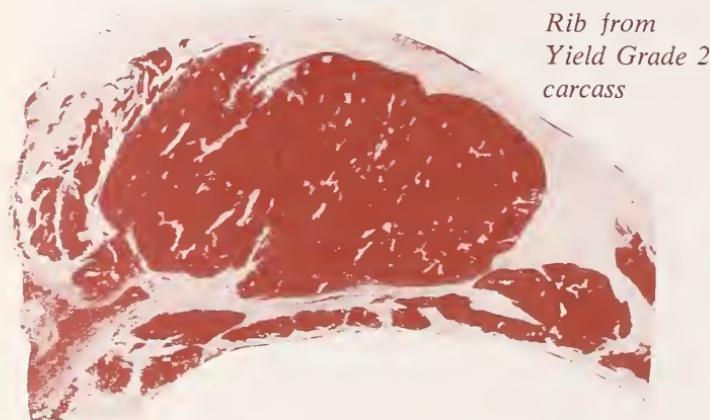


Fig. 11. Yield Grade 2 (2.5)
Carcass weight 650 lbs.
Adjusted fat thickness 0.4 in.
Area of ribeye 12.7 sq. in.
Estimated % kidney, pelvic, and heart fat 3.0%

Differences in value due to differences in yield grade—such as those shown in the example on page 16—are developed from yields of cuts typical of the grades being compared. Such a comparison is shown in Table I for carcasses of Yield Grades 2 and 4. The rib pictures and measurements shown in Figures 11 and 12 are included to illustrate Choice grade beef typical of each of these yield grades.

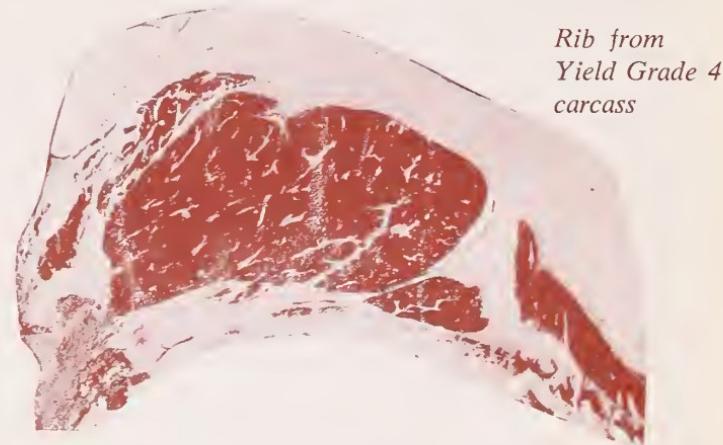


Fig. 12. Yield Grade 4 (4.5)
Carcass weight 620 lbs.
Adjusted fat thickness 0.8 in.
Area of ribeye 10.1 sq. in.
Estimated % kidney, pelvic, and heart fat 4.0%

**TABLE I COMPARISON OF YIELDS* OF RETAIL CUTS AND RETAIL VALUES
BETWEEN USDA YIELD GRADE 2 AND YIELD GRADE 4 CARCASSES**

Closely Trimmed Retail Cuts	Percent Carcass Weight		Price per Pound**	Retail Value in Dollars per cwt.	
	USDA 2	USDA 4		USDA 2	USDA 4
Rump, boneless	3.5	3.1	\$1.12	\$ 3.92	\$ 3.47
Inside round	4.5	3.7	1.17	5.27	4.33
Outside round	4.6	4.2	1.15	5.29	4.83
Round tip	2.6	2.4	1.19	3.09	2.86
Sirloin	8.7	7.9	1.14	9.92	9.01
Short loin	5.2	5.0	1.36	7.07	6.80
Rib, short cut (7")	6.2	6.0	1.01	6.26	6.06
Blade chuck	9.4	8.4	.56	5.26	4.70
Chuck, arm, boneless	6.1	5.5	.83	5.06	4.57
Brisket, boneless	2.3	1.9	.93	2.14	1.76
Flank steak	.5	.5	1.14	.57	.57
Lean trim	11.3	9.3	.73	8.25	6.79
Ground beef	12.2	10.0	.53	6.47	5.30
Fat	12.7	22.9	.03	.38	.69
Bone	9.9	8.9	.01	.10	.09
Kidney	.3	.3	.38	.11	.11
TOTAL	100.0	100.0		\$69.16	\$61.94

Difference in retail value per cwt. between Yield Grade 2 and 4—\$7.22



* Cuts trimmed to $\frac{1}{2}$ inch of fat.

** Average retail prices for January 1968 (including sale priced items) as furnished by a large number of selected retailers throughout the country.

YIELD GRADES FOR THE PACKER

USDA yield grades provide packers a means of precisely identifying beef for cutability.

Most buyers' complaints or rejections of beef at time of delivery are based on excess fat. These complaints and rejections could largely be eliminated through use of USDA yield grades. By using both quality and yield grades as a basis for marketing his beef a packer can effectively sell on a nationwide basis and have nearly complete assurance that

his beef will meet with the buyer's approval.

Packers can also make use of yield grades in their buying operations by applying the principles of evaluating live cattle for fatness and muscling. Yield grades furnish a packer the opportunity to increase his profits through (1) greater precision in buying cattle and in selling beef more nearly in line with their real value and (2) concentration on the slaughter of the kinds having the greatest margin.

YIELD GRADES FOR THE CONSUMER—ALL OF US

Yield grades provide an indirect means for reflecting consumers' preferences for beef with a high ratio of lean to fat and bone back through retailers and packers to the producer. Thus, they can be very effective in bringing about changes which will eliminate much of the waste now present in the production and marketing of beef. It costs money to put excess fat on cattle—and it costs money to ship this excess fat around the country. Each year retailers trim more

than 2 billion pounds of fat from the fed beef portion of our cattle production. To the producer, that fat represents an estimated cost of \$1.25 billion. But as a by-product of the retail beef business, it represents a value of only about \$100 million.

In feeding cattle to get the quality of meat desired by consumers there will always be some excess fat. However, at least one-half of the excess fat now being produced could

be eliminated through improved beef breeding and management programs without any sacrifice in the eating quality of the meat. This would mean a net savings of about \$30 per head in the cost of producing our fed beef.

The use of yield grades to identify strains of cattle and production methods which produce high quality beef with a minimum of waste fat can help bring about these savings—savings which could, in turn, mean better values for

consumers and greater returns for producers.

Many consumers who own home freezers also regularly buy beef as “sides” or “quarters” to gain the savings from quantity buying. For these consumers, USDA yield grades offer the same advantages as they do to retailers. Consumers who buy by yield grade can have complete confidence as to how much meat they will actually get and, therefore, its average cost.

Yield Grade—Symbol of Value

USDA yield grades provide an additional marketing tool for use by all who buy or sell cattle and beef. They are a means of identifying one of the important value-determining characteristics—the proportion of trimmed, retail cuts that can be cut from a beef carcass. Used in conjunction with quality grades, yield grades enable sellers and buyers

to arrive at prices commensurate with value. This results in greater marketing efficiency and assurance that consumers' preferences are relayed back through the marketing channels to the producer. That is where basic changes to improve our cattle and beef must originate.



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